APPENDIX C

LOS SYSTEM DATA SHEET

The data sheets of Figure C-1 may be used in the calculation of the LOS System parameters.

FROM: TO:

I. SYSTEM REQUIREMENTS

Type of Transmission (Voice, TTY, etc.)
Number of Voice Channels
Desired Reliability
Maximum Allowable Channel Noise 6000 mi. cct.
Maximum Modulating Frequency , FM
RF Carrier Frequency, F
Modulation Index
Site Coordinates:

LA ____° ____' ____" N Lat ____° ____' ____" W Long
LB ____° ____' ____" N Lat ____° ____' ____" W Long

II PRELIMINARY CALCULATIONS

Great Circle Distance , D
Revr. Bandwidth, BW = $2(\Delta F_p + F_m)$

III. LOSSES - dB

Trial	Change	Change	Change

Free-Space Loss, L_{FS} = 37 + 20 log D (miles) + 20 log f (MHz)
Misc. Transmission Loss
TOTAL LOSSES

IV. MINIMUM USABLE SIGNAL, MUS

= 204 dBW+ 10 log BW + 12 dB + 10 dB

V. ADDITIONAL GAIN REQUIRED FOR 99.99% RELIABILITY (FADE MARGIN)

VI. ACTUAL MINIMUM USABLE SIGNAL, AMUS
= MUS + FADE MARGIN

AIAA615 (A)

Figure C-1. Line-of-Sight System Data Sheet (Sheet 1 of 3)

Trial	Change	Change	Change

VII. TOTAL REQUIRED GAIN in dBW
= TOTAL LOSSES + AMUS

VIII. GAINS - dBW

Trial	Change	Change	Change

Xmtr Gain, $G_{TR} = 10 \log P_T$

Antenna Gain , $G_A = 20 \log f + 20 \log D_A - 52.6$

Diversity Gain, G_{DIV}

TOTAL GAIN

IX. SYSTEM FEASIBILITY

(Compare Step VIII and Step VII)

Adjustment Required ☐
OK ☐

X. MEDIAN CARRIER-TO-NOISE RATIO, C/N
= FADE MARGIN + 10 dB

XI. SIGNAL-TO-NOISE RATIO , S/N
$= C/N + 10 \log\left(\frac{BW}{bw}\right) + 20 \log$ (Modulation Index)
+ PF - L - MUX

XII. CHANNEL NOISE FACTOR
= 82 - S/N

XIII. ALLOWABLE MEDIAN NOISE

L > 151 NMI
27 < L < 151 NMI
L < 27 NMI
MAX ALLOWABLE NOISE

XIV. SUMMARY

Desired Reliability: 99.99%
Max. Allowable Channel Noise: 15.6 dBa0

Actual Reliability: _____
Actual Channel Nose: _____

AIAA 615 (B)

Figure C-1. Line-of-Sight System Data Sheet (Sheet 2 of 3)

Recommended Design Parameters:

Transmitter Power: ____ watts
Antenna Size: ____ feet
Diversity, order of: _____

GENERAL NOTES

o The maximum modulating frequency is the sum of the minimum modulating frequency (60 kHz); the voice channel bandwidth (a product of the number of voice channels and the nominal 4 kHz spacing); and the spacing between basic supergroups (12 kHz).

o See Appendix D if Great Circle distance must be determined exactly (to five place accuracy). Otherwise, measurements from a map with $\pm$ 10-mile accuracy will suffice.

o To allow for losses associated with transmission lines, coupling, transition, duplexers, etc., a figure of 4 dB is given for systems using 1 kMHz and a figure of 6 dB is used for 2 kMHz systems.

o In this equation 12 dB = receiver-noise figure and 10 dB = C/N figure. These are approximate values and may be changed to fit the specific case. For instance, if parametric amplifiers are used, the 12 dB receiver-noise figure is changed to 2 dB.

o In this equation C/N is that computed in Step X, BW is that computed in Step II, bw = voice channel bandwidth, PF = pre-emphasis gain, L = channel loading factor, and MUX = multiplex equipment noise insertion (about 2 dB.).

AIAA 615(C)

Figure C-1. Line-of-Sight System Data Sheet (Sheet 3 of 3)